

WHAT IS CLAIMED IS:

1. An electromagnetic load drive apparatus for an electromagnetic load having an inductive element, the apparatus comprising:

5 a DC low voltage power source;

a capacitive element as a power source for feeding electric power to the inductive element at the time of operating the electromagnetic load, and recovering energy accumulated in the inductive element due to supply of electric power, the energy
10 being recovered by the capacitive element at the time when the operation of the electromagnetic load is stopped;

first switching means for switching between a first state where a terminal of the capacitive element on a reference potential side is connected to a terminal of the low voltage power
15 source on a side opposite to the terminal of the reference potential side and a second state where the terminal of the capacitive element on the reference potential side is connected to a terminal of the low voltage power source on the reference potential side; and

20 control means for controlling the first switching means to select the first state when the electromagnetic load is in operation so that the electric power is fed to the inductive element from the capacitive element and the low voltage power source that are connected in series, and to select the second
25 state when the operation of the electromagnetic load is stopped.

2. An electromagnetic load drive apparatus according to claim 1, further comprising:

an assisting capacitive element which is another capacitive element in parallel with the capacitive element for feeding electric power to the inductive element, the assisting capacitive element being electrically charged by the low voltage power source in the second state.

3. An electromagnetic load drive apparatus according to claim 2, further comprising:

a charging line for electrically charging the assisting capacitive element from the low voltage power source and having a diode which sets, as a forward direction, a direction in which the charging current flows from the low voltage power source to the assisting capacitive element.

4. An electromagnetic load drive apparatus according to claim 1, further comprising:

a recovery line for recovering the energy accumulated in the inductive element by the capacitive element and having a diode which sets, as a forward direction, a direction in which a recovering current flows from the inductive element to the capacitive element.

5. An electromagnetic load drive apparatus according to claim 1, further comprising:

a feeder line for the low voltage power source for feeding the electric power from the low voltage power source to the inductive element and having a diode, which sets, as a forward direction, a direction in which a feeding current flows from the low voltage power source to the inductive element.

6. An electromagnetic load drive apparatus according to claim 1, further comprising:

a feeder line for the capacitive element for feeding electric power to the inductive element from the capacitive element and having a diode which sets, as a forward direction, a direction in which the feeding current flows from the capacitive element to the inductive element.

7. An electromagnetic load drive apparatus according to claim 1, further comprising:

second switching means for opening and closing the feeder line for the low voltage power source,

wherein the control means controls the second switching means so that the second switching means is turned on and off at the time when the energy is recovered by the capacitive element from the inductive element, and transfers the energy accumulated in the inductive element during an ON period of the second switching means to the capacitive element during an OFF period of the second switching means, and stops turning on and off operation of the second switching means when the voltage across

the terminals of the capacitive element assumes a predetermined end voltage.

8. An electromagnetic load drive apparatus according to claim 7, wherein the control means sets the end voltage so that a sum of a voltage across the terminals of the low voltage power source and the end voltage assumes a predetermined value.

9. An electromagnetic load drive apparatus according to claim 7, wherein the control means sets the end voltage so that a sum of the voltage across the terminals of the low voltage power source and the end voltage assumes a predetermined value that is set based on the voltage across the terminals of the low voltage power source, and sets the predetermined value to a value that increases with a decrease in the voltage across the terminals of the low voltage power source.

10. An electromagnetic load drive apparatus according to claim 1, further comprising:

selection means for selecting any one of a plurality of the inductive elements; and

a recovering line through which the energy accumulated in the inductive element is recovered by the capacitive element in correspondence with each of the inductive elements.